Grasim Industries Limited

(Chemical Division Renukoot)

FY 2022-23

Environmental Statement (Form – V)

ES for Power Generation Division

Prepare & Submitted By

Grasim Industries Limited
Chemical Division, Renukoot
Sonebhadra, U.P. -231217

INTRODUCTION

Department of Environment and Forests, Government of India (GOI) under the Environment (Protection) Act, 1986 has made Environmental Statement mandatory for all industries and the report prepared by competent experts has to be submitted to the concerned Pollution Control Board. This is a measure to check any adverse impacts of the processes on the occupational and surrounding environment.

The Environmental Audit programme included the following:

Assessment of compliance status with respect to environmental regulations and Assessment of environmental management system's capability to cope up with existing requirement of CPCB/UPPCB.

CSIR-NEERI-HZC for Bi-annual monitoring and M/s ETRC - Lucknow has been engaged for monitoring of stack emission, ambient air monitoring, solid waste hazardous, water and effluent testing of M/s. Grasim Industries Limited, Renukoot for monthly monitoring respectively from April, 2022 to March, 2023. Based on these Bi-annual and monthly monitoring reports, Annual Environmental Statement Audit (AESA) for the year 2022 - 2023 has been prepared. This Environmental audit report contains data pertaining to ambient air quality, stack emission, water and wastewater quality, hazardous and non-hazardous solid waste generation and its disposal system and other plant details related to environmental pollution and management.

PLANT SITE AND SURROUNDINGS

M/s- Grasim Industries Limited, Renukoot, Sonebhadra UP is located on distance of 2 km from Renukoot Railway station of district- Sonebhadra, Uttar Pradesh.

PART – A

GENERAL INFORMATION ABOUT THE COMPANY

1. Name of the Company : M/s. Grasim Industries Limited
Power Generation Division Renukoot

2. Name & Address of the Owner/Occupier : **HARI KRISHNA AGARWAL**
P.O - Renukoot 231 217
Dist. Sonebhadra (U.P.)

3. Registered Office Address : Birla gram Nagda – 456 331 M.P.

4. Factory Address : P.O. Renukoot – 231 217
Distt. Sonebhadra, (U.P.)

5. Production Installed Capacity :

Sl. No.	Name of Product	Consented Capacity (MW)
1	Electricity	50 MW (2*25 MW)

6. Year of Establishment : 1996 & 2005

7. Date of last Environmental Statement submitted : Submitted to U.P. Pollution Control board vide our letter no GIL/ENV/2022-23/67, dated September 19, 2022

PART – B

1. **TOTAL WATER CONSUMPTION**:

Sl. No.	Description	Consumption (m^3/day)
a	Process	518
b	Cooling	1400
c	Domestic	-
d	Green belt	Treated STP effluent is used for green-belt development.

2. WATER CONSUMPTION PER UNIT OF PRODUCT:

Name of Product	Water consumed per unit of product manufactured (l/kwh)	
	(2021-22)	(2022-23)
Electricity	2.71	2.67

3. RAW MATERIAL CONSUMPTION:

S .No.	Name of the raw material	Name of Product Concerned	Raw material consumed per unit of product manufactured (g/kwh)	
			(2021-22)	(2022-23)
1	Coal	Electricity	933.46	968.9
2	HSD	Electricity	0.11	0.08

PART – C

1. WATER POLLUTION

Sl. No.	Pollutant Parameters	Qty. of Pollutants generated	Concentration of pollutants in untreated effluent (completely recycled to achieve ZLD)	% Variation from prescribed standards
		(kg/day)	**(mg/l)**	-
1	---	Nil	Nil	– – –

Note: It is to be noted that since we are maintaining zero liquid discharge of effluent from August -2017, Hence the above discharge load is also zero.
*All effluent of Power Division is being transferred to Final ETP of Chemical Division and Unit has achieved zero liquid discharge facility from August -2017

Parameter	Months (FY 2022-23)												
	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Average
pH	7.8	7.6	6.9	7.0	7.1	7.0	7.3	7.1	6.1	7.7	7.4	7.6	7.2
TSS	8.8	8.2	9.2	7.6	8.6	6.2	7.9	5.6	8.2	BDL	BDL	5.6	7.6
TDS	478.0	464.0	185.3	124.0	120.0	170.0	188.0	436.5	96.6	174.6	200.2	208.6	237.2
O & G	1.8	2.0	0.0	0.0	0.0	0.0	0.0	BDL	BDL	BDL	BDL	BDL	0.5
Cl	182.0	175.0	48.0	30.0	28.0	24.0	22.1	26.2	26.2	40.0	96.1	72.2	64.2
BOD	8.0	10.0	8.0	8.2	8.4	4.2	4.1	2.6	2.8	1.2	2.4	4.6	5.4
COD	52.0	46.0	24.2	56.0	52.0	12.0	16.0	8.0	8.0	4.0	8.0	20.0	25.5

Note: - All parameters are in mg/Ltr except pH.

Adoption of ZLD meant comprehensive management of wastewater, through reduced use, efficient recycling and treatment to ensure that discharge of liquid wastes by industrial units was completely eliminated. A multi-level approach to water recovery with modifications was implemented in the production processes.

The plant planned and achieved ZLD by following the 3Rs of reduce, reuse and recycle as the first step.

- **Reduce**: Reduction of water consumption across different processes either through technological changes or through process optimization.
- **Reuse**: Use of water generated from one process in the same or different processes after testing the quality of generated water.
- **Recycle**: Treatment of effluents in such a way that maximum water could be recovered for reuse within the production cycle.

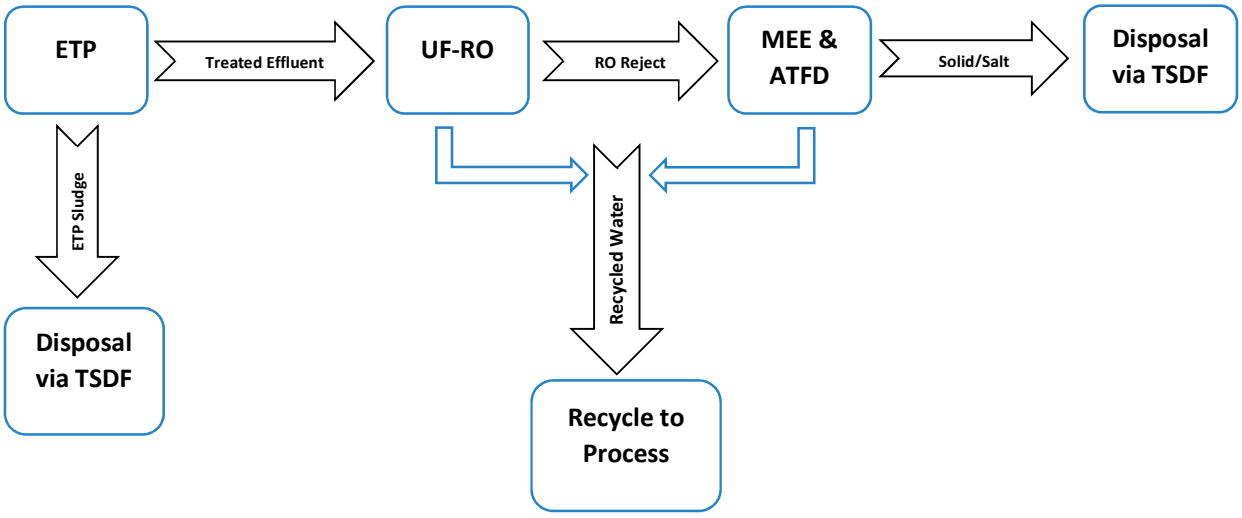
The successful implementation of the 3R processes were, however, preceded by a detailed understanding of the nature of effluents and the quality of wastewater involved. The areas worked on are as explained below:

- Knowing the quality and volume of each effluent generated from different processes
- Segregating and collecting the same quality of effluents for use in same or different processes
- Developing a facility for collection of effluents from different processes for final treatment in ETP
- Reducing the effluent volume as best possible, to make ZLD cost effective

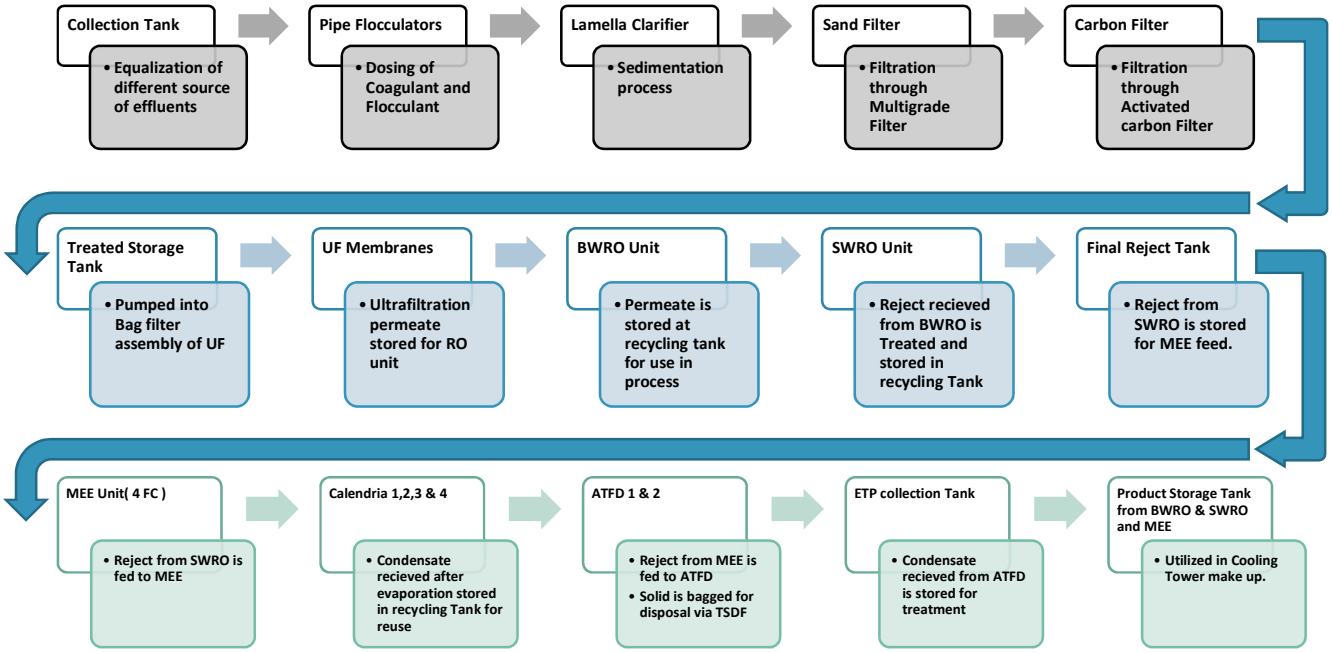
In the second step, the balance wastewater after the 3R approach was passed through Double stage RO plant and Multi-Effect Evaporator to achieve the ZLD status.

The effluent from various sections is collected in effluent collection pit where it is collected for equalization. The pH of the effluent after equalization is maintained in the desired range with alkali or acid, whatever may be the requirement. The neutralized effluent is then passed through pipe flocculator into flocculation tank where dosing of polyelectrolyte is done using flash mixer. Effluent dosed with polyelectrolyte then goes to lamella clarifier where sufficient retention time is given for settling and clarification. By gravity suspended solids settle down and are removed as sludge from the bottom. The sludge is then dewatered at filter press. The water from filter press is again recycled back in collection tank. The filter cake is filled in bags and stored for disposal in TSDF.

Effluent Treatment Flow Diagram:



Effluent treatment process flow –



2. AIR POLLUTION:

Unit: PGD 1				
S. No.	**Pollutant Parameters**	**Qty. of pollutants generated (kg/day)**	**Concentration of pollutants in discharge (mg/Nm^3)**	**% variation from prescribed standards**
1	Particulate matter (SPM)	191.13	48.92	Within limits
2	SO2	1261.45	322.88	-do-
3	NOx	654.30	167.48	-do-
Avg. emission (Nm^3/ hr.) :		**162784.86**		

Unit: PGD 2				
S. No.	**Pollutant Parameters**	**Qty. of pollutants generated (kg/day)**	**Concentration of pollutants in discharge (mg/Nm^3)**	**% variation from prescribed standards**
1	Particulate matter (SPM)	207.65	39.86	Within limits
2	SO2	1764.22	338.64	-do-
3	NOx	1149.87	220.60	-do-
Avg. emission (Nm^3/ hr.) :		**217073.21**		

Unit #	**Quarters**	**Parameters**				
		PM mg/Nm3	**SOx** mg/Nm3	**NOx** mg/Nm3	**CO2** %	**Hg** mg/Nm3
PGD 1	**Q 1**	80.30	394.22	225.23	9.53	0.00
	Q 2	41.23	318.36	154.34	8.43	0.00
	Q 3	19.65	148.14	71.61	3.87	0.00
	Q 4	54.50	430.81	218.72	11.07	0.00
Average FY 22-23		**48.92**	**322.88**	**167.48**	**8.23**	**0.00**
PGD 2	**Q 1**	44.99	319.96	301.50	10.13	0.00
	Q 2	44.18	445.64	213.76	12.30	0.00
	Q 3	42.18	372.18	222.43	11.83	0.00
	Q 4	28.08	216.78	144.71	7.63	0.00
Average FY 22-23		**39.86**	**338.64**	**220.60**	**10.48**	**0.00**

Summary of PGD Boilers Stack Emission Results for FY 2022-23

Q 1		Parameters				
Unit #	**Months**	**PM** mg/Nm3	**SOx** mg/Nm3	**NOx** mg/Nm3	**CO2** %	**Hg** mg/Nm3
PGD 1	**APR**	86.24	238.37	242.15	11.8	0.00
	MAY	81.23	470.05	185.05	8.5	0.00
	JUN	73.43	474.24	248.48	8.3	0.00
Avg. of Q 1		**80.30**	**394.22**	**225.23**	**9.53**	**0.00**
PGD 2	**APR**	45.32	44.27	472.8	11.6	8.6
	MAY	42.80	432.00	178.00	10.70	0.00
	JUN	46.84	483.6	253.7	8.1	BDL
Avg. of Q 1		**44.99**	**319.96**	**301.50**	**10.13**	**0.00**

Q 2		Parameters				
Unit #	**Months**	**PM** mg/Nm3	**SOx** mg/Nm3	**NOx** mg/Nm3	**CO2** %	**Hg** mg/Nm3
PGD 1	**JUL**	62.36	479.86	232.82	12.5	0.00
	AUG	61.34	475.21	230.21	12.8	0.00
	SEP	0	0	0	0	0.00
Avg. of Q 2		**41.23**	**318.36**	**154.34**	**8.43**	**0.00**
PGD 2	**JUL**	45.42	453.22	214.66	12.6	0.00
	AUG	42.56	439.79	212.53	12.4	0.00
	SEP	44.57	443.91	214.1	11.9	0.00
Avg. of Q 2		**44.18**	**445.64**	**213.76**	**12.30**	**0.00**

Q 3		Parameters				
Unit #	**Months**	**PM** mg/Nm3	**SOx** mg/Nm3	**NOx** mg/Nm3	**CO2** %	**Hg** mg/Nm3
PGD 1	**OCT**	0	0	0	0	0.00
	NOV	0	0	0	0	0.00
	DEC	58.94	444.43	214.82	11.6	0.00
Avg. of Q 3		**19.65**	**148.14**	**71.61**	**3.87**	**0.00**
PGD 2	**OCT**	42.26	438.6	216.2	11.8	0.00
	NOV	42.8	335.08	231.52	11.9	0.00
	DEC	41.47	342.85	219.56	11.8	0.00
Avg. of Q 3		**42.18**	**372.18**	**222.43**	**11.83**	**0.00**

Q 4		Parameters				
Unit #	Months	PM mg/Nm3	SOx mg/Nm3	NOx mg/Nm3	CO2 %	Hg mg/Nm3
PGD 1	JAN	56.34	435.84	211	11.4	0.00
	FEB	51.28	433.49	234.59	11.2	0.00
	MAR	55.89	423.1	210.58	10.6	0.00
Avg. of Q 4		**54.50**	**430.81**	**218.72**	**11.07**	**0.00**
PGD 2	JAN	42.36	329.89	225.05	11.5	0.00
	FEB	41.89	320.45	209.08	11.4	0.00
	MAR	0.00	0.00	0.00	0.00	0.00
Avg. of Q 4		**28.08**	**216.78**	**144.71**	**7.63**	**0.00**

Summary of Ambient Air Quality Results

Location	Parameter								
	PM 10 ug/m^3	PM-2.5 ug/m^3	SO_2 ug/m^3	NO_x ug/m^3	Lead (Pb) ug/m^3	CO mg/m^3	O_3 ug/m^3	CO2 NA	Cl_2 NA
ETP plant	61.58	39.45	12.60	16.60	BDL	0.54	14.17	NA	NA
Main gate	74.51	43.18	12.95	18.30	BDL	0.57	15.39	NA	NA
PGD (area)	74.90	43.81	13.32	18.22	BDL	0.62	15.97	NA	NA
Project Office	64.13	38.30	11.84	16.19	BDL	0.57	15.02	NA	NA

PART – D

(As specified under Hazardous Waste (Management and Transboundary Movement) Rules, 2016

Sl. No.	Description	Total quantity in MT (2021-22)	Total quantity in MT (2022-23)
A	**FROM PROCESS**		
1	5.1-waste Oil	9.570*	6.200*
B	**FROM POLLUTION CONTROL FACILITIES**		
	-	-	-

❖ * The quantity mentioned here is combined for both Chemical Division and Power division.

PART – E

(Solid Waste)

Sl. No.	Description	Total quantity in MT (2021-22)	Total quantity in MT (2022-23)
a	**From process**		
1.	Bottom Ash	11748 MT	8501 MT
b	**From pollution control facilities**		
1.	Fly Ash	110888 MT	110747 MT
C1	Qty. recycled or utilised within limits	27529.2 MT*	3398 MT*
C2	Sold	-	-
C3	Disposed/utilized	95107**	115881**

- * Quantity is utilized in brick manufacturing, construction.
- ** Quantity is sent to cement industry for utilization and filling of low lying area.

PART – F

(Characteristics of Hazardous and Solid Waste)

Sl. No.	Description	Nature of waste	Composition/Characteristics	Quantity (MT) (FY 2022-23)	Management (Methods of Collection & Disposal)
1.	Waste Oil	Hazardous	PCBs, Lead, Arsenic, Cadmium, Chromium, PAHs etc.	6.200*	Filled in MS drums and stored at impervious surface. Recycled/Disposed through TSDF
2	Fly Ash	Non-Hazardous	Sodium oxide, magnesium oxide, alumina, silica, calcium oxide, iron oxide, etc.	110747	Stored in silos and dispatch to cement industries
3.	Bottom Ash	Non-Hazardous	Unburned carbon, Silica Oxide, calcium oxide, Ferric oxide , etc.	8501	Stored and utilized in filling low-lying area, construction and in brick manufacturing

❖ * The quantity mentioned here is combined for both Chemical Division and Power division.

PART - G

(Impact of pollution control measures on conservation of natural resources and consequently on the cost of production)

Cost estimation for pollution control

Sl. No.	Description	Total expenditure (in lacs)	
		(2021-22)	(2022-23)
1	Water Pollution	2	1.5
2	Air Pollution	15.54	71.76
3	Solid & Hazardous waste	206.6	127.2
4	Green Belt development	1.1	2
5	Others	9.8	5.7
Total		**235.04**	**208.16**

*Housekeeping Expenses

PART – H

(Additional measures/ investment proposal for environmental protection including abatement of pollution)

Dust Suppression: water sprinkling system has been installed and maintained for the mitigation of fugitive emission.

Air Pollution Control Measure: Annual maintenance of ESP unit is being done for the optimum efficiency of the units.

Coal unloading area: the cold is transported by wagon/rail to premises as to reduce carbon footprints and frequent movement of trucks, besides rail tracks the area is being concreted for better management of coal that reduced the problem of dust and chances of land contamination especially in rainy season.

The Aditya Udyan and Revamping of Fly Ash Reclamation Site throw Miyawaki Method of Plantation:

The Miyawaki model of plantation is a unique methodology endowed by a Japanese botanist Akira

Miyawaki which aims to plant trees in a specific manner that induce plants with time through introducing native plant species and developing the ecosystem dense an optimal growth. Grasim Unit by adopting Miyawaki Plantation Model, has successfully developed green belt at its Fly Ash Reclamation site by developing Green vegetation over the said area, resulting reclamation of fly ash area successfully. Unit has proudly named this developed green plantation area as "Aditya Udyan". The unit planted 15000 trees of 16 different types of species appropriate with the topography and geography of the location at our Ash reclamation site and to ensure 100% survival along with covering of the mortality of the plants, extra 3050 trees were planted. Plants like Neem, Peepal, Arjun, Amaltaas, Kadam, etc. were planted during the consistent plantation drive. Out of total industrial area, Unit has been successful in bringing its 62% area under Green Belt which is just double the green belt development target of National Forest Policy. During summer season when temperatures ranges from 38-46 °C at Renukoot, the fly ash becomes dry and gets airborne, thus making it a major source of air pollution at such times. To avoid any adverse impact on environment and health, it has always been desirable to revegetate these sites for aesthetic purposes, to stabilize the surface ash against wind along with water erosion and to reduce the quantity of water leaching through the deposits.

A total of 18050 plants were planted at the site to create a denser and greener environment around the Grasim Campus. This resulted in the increase of the overall green cover present in the plant which will subsequently contribute to the carbon sequestration. The "Aditya Udyan" has allowed all types of visitors to visit the plantation site at all times. Furthermore, attributes like dynamic colour programmed fountain is added in the Udyan to enhance the aesthetic appeal and subsequently, it will inherit the culture and idea of Clean & Green Grasim Campus. No doubt our "Aditya Udyan" has

become a must visit site for all nature lovers, to watch beautiful Birds & Butterflies relishing in their natural habitat.

The total amount incurred during this project and drive was Rs. 41.75 Lakhs (INR).

Water Conservation: Treatment & Recycling:

Apart from recycling of generated effluent recycled inside plant premises, all domestic effluent generated from colony is treated with STP plant of capacity 1000 KLD followed by UF plant, installed and continuous operation of UF unit is ensured and the treated permeate is utilized in cooling towers for make-up water.
The generated sewage sludge is dewatered with press filter and used in gardening.

PART – I

(Any other particulars for improving the quality of environment)

GIL always puts environmental issues on top priority. As a result of continuous efforts, GIL got certified for the following ISO standards by TUV NORD CERT:

- ISO-9001:2015
- ISO-14001:2015
- ISO-45001:2018
- ISO-50001:2018

GIL has a separate environmental Management Cell and its function includes monitoring of Water usages and consumption trends, wastewater treatment and its parameter control, Source and Ambient Air Quality monitoring that is monitored and assessed by GIL's top management.

A separate fully equipped Environment laboratory is maintained at GIL for monitoring Environmental parameters as per EC condition.

GIL trains its employees for environmental conservation activities and need of the ecological balance for sustainable development and operation process.

Electrostatic Precipitators (ESP) for Particulate Matter

In the boilers are equipped with electrostatic precipitators (ESP) for controlling the fly ash emissions. Fly ash emissions from the power plant are controlled by installation of electrostatic precipitator. The ESP has been provided with each unit to limit the particulate emissions in the flue gas to within 100 mg/Nm3 and 50 mg/Nm3 for Unit No. 1 & 2, respectively. Ash handling system has provided for removing the furnace and fly ash. The scheme of ESP and its typical view are shown in Figure 1 and 2.

The electrostatic precipitator utilizes electrostatic forces to separate dust particles from the gas to be cleaned. The gas is conducted to a chamber containing "curtains" of vertical steel plates. These curtains divide the chamber into a number of parallel gas passages. A frame with secured wires is located within each passage. All the frames are linked to each other to form a rigid frame work. The entire frame work is held in place by four support insulators, which insulate it electrically from all parts which are grounded.

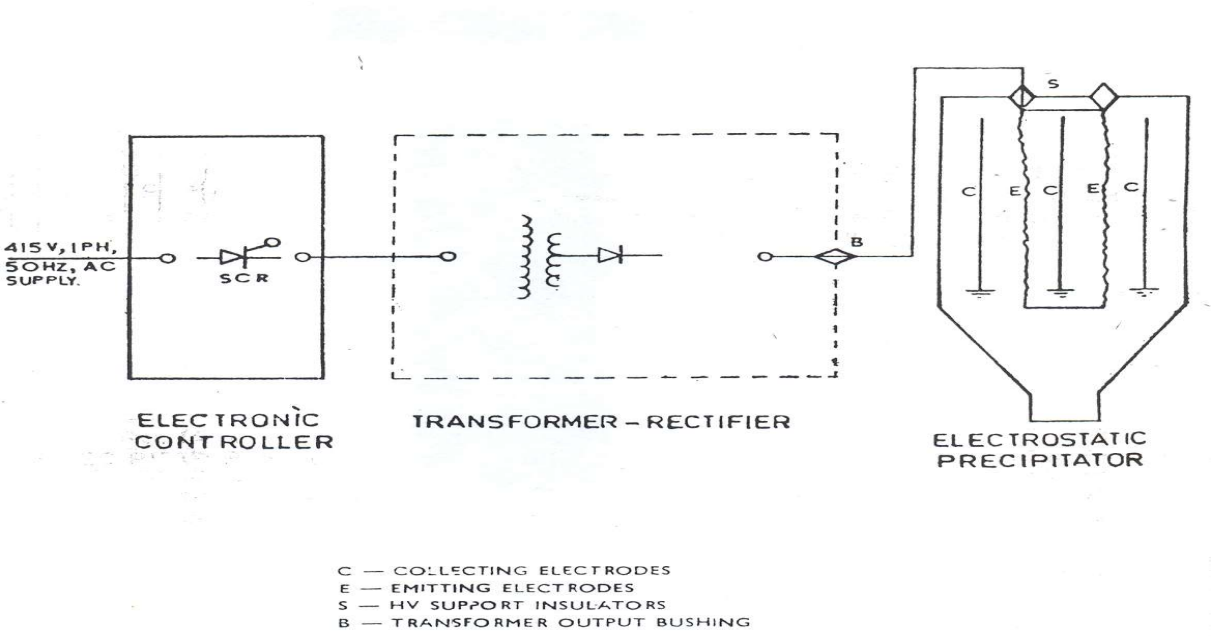


Figure No. 1: SCHEME OF ELECTROSTATIC PRECIPITATOR

A high voltage direct current is connected between the framework and the ground, thereby creating a strong electrical field between the wires in the framework and the steel curtains. The electrical field becomes strongest near the surface of the wires so strong that an electrical discharge "the corona discharge" develops along the wires. The gas is ionized due to the

corona discharge and large quantities of positive and negative ions are formed. The positive ions are immediately attracted towards the negative wires by the strength of the field. The negative ions, however, have to traverse the entire space between the electrodes to reach the positive curtains. Enroute towards the steel curtain, the ions collide with and adhere to the dust particles in the gas. The particles thereby become electrically charged and also begin to migrate in the same direction as the ions towards the steel curtains and stick on to them. These curtains are rapped periodically to dislodge the dust, which is collected in the hoppers.

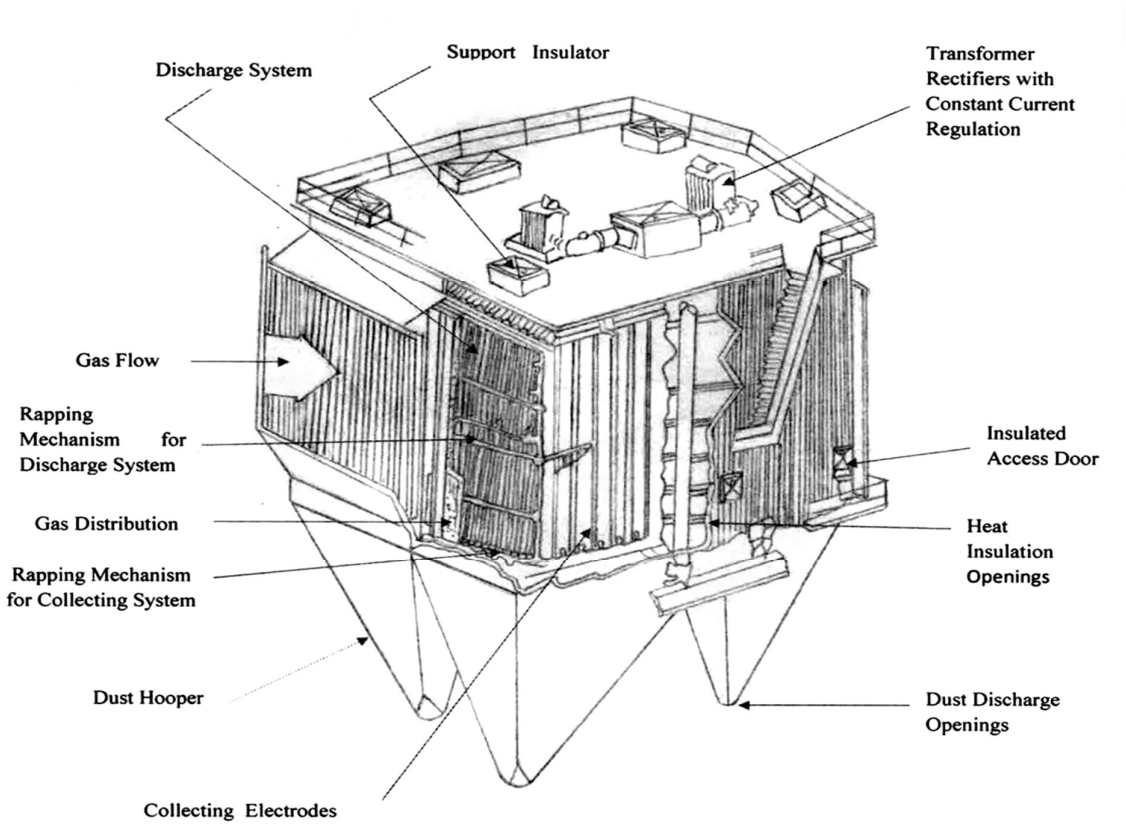


Figure No. 2: TYPICAL VIEW OF ELECTROSTATIC PRECIPITATOR (ESP)

Sources of Emission of the Air Pollutants and Adopted Control Measures

S. No.	Pollutant	Sources of Emission	Control Measures
1.	SPM	Coal handling and crushing	Sprinklers in the coal storage areas, dust suppression system in the coal crushing units, transfer hopper and conveyor transfer points.
		Fuel combustion (coal with high percentage of inert & diesel)	Electrostatic Precipitator
2.	SO_2	Combustion of coal (containing 0.3 to 0.4% sulphur) used for generation of steam	Two flue stacks with 75 meter height.

Ash Disposal

Ash is being disposed in dry condition by disposal system. There is possibility of air pollution nuisance in connection with dry ash disposal system hence GIL installed silo and using closed bulkers for transportation to avoid air pollution.

Replacement of Existing Lamps with Energy Efficient LED/ Induction Lamp.

GRCD has pro-actively started water sprinkling inside the colony and outside the premises to mitigate the dust exposure for the improvement of Air quality.

GIL is actively involved in awareness programme related to Environment like celebration of Environment Day like every year. Various activities were organized among children, ladies, workers, employees.

V.K. Yadav

(Dr. Vinay Yadav)